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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|-----------------------------|---------------------|------------------|
| 10/521,544 | 01/14/2005 | Shiro Sakai | 08228/071001 | 9344 |
| 22511 7590 03/18/2008 OSHA LIANG L.L.P. 1221 MCKINNEY STREET SUITE 2800 HOUSTON, TX 77010 | | | | |
| EXAMINER QUINTO, KEVIN V | | | | |
| ART UNIT 2826 | | PAPER NUMBER | | |
| NOTIFICATION DATE 03/18/2008 | | DELIVERY MODE ELECTRONIC | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/521,544

Applicant(s)

SAKAI ET AL.

Examiner

Kevin Quinto

Art Unit

2826

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2008.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☒ Claim(s) 12-15 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-893)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Response to Arguments

1. This Office action is in response to the amendment filed under C.F.R. § 1.116 on February 20, 2008. The amendment has been entered.

Allowable Subject Matter

2. The indicated allowability of claims 1-3 and 8-11 is withdrawn in view of the newly discovered reference(s) to Chang et al. (USPN 6,441,403 B1). Claims 4-7 are rejected as well using the Chang reference. Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 8, and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al. (USPN 6,441,403 B1).

5. In reference to claim 1, Chang et al. (USPN 6,441,403 B1, hereinafter referred to as the "Chang" reference) discloses a structure which meets the claim. Chang discloses (claims 1-24, columns 6-8) a gallium nitride (GaN)-based compound semiconductor device having a GaN-based light emitting member with a buffer layer adjacent to a light emitting layer member which comprises a multilayer quantum well layer structure including an InGaN well layer and an AlInGaN barrier layer.
6. With regard to claim 8, the buffer layer adjacent to the light emitting layer is an AlInGaN buffer layer.
7. In reference to claim 11, the examiner notes the limitation regarding the formation temperature of the InGaN and AlInGaN layers. However this places claim 11 into the form of a **product-by-process claim**:

Note that a "product by process" claim is directed to the product per se, no matter how actually made, *In re Hirst*, 190 USPQ 15 at 17 (footnote 3). See also *In re Thorpe*, 227 USPQ 964, 966; *In re Luck*, 177 USPQ 523; *In re Fessmann*, 180 USPQ 324; *In re Avery*, 186 USPQ 161; *In re Wertheim*, 191 USPQ 90 (209 USPQ 554 does not deal with this issue); and *In re Marosi et al.*, 218 USPQ 289, all of which make it clear that it is the patentability of the final product per se which must be determined in a "product by process" claim, and not the patentability of the process, and that an old or obvious product produced by a new method is not patentable as a product, whether claimed in "product by process" claims or not. Note that applicant has the burden of proof in such cases, as the above case law makes clear. See also MPEP 2113.

Claim 11 does not patentably distinguish over the Chang reference regardless of the process used to form the InGaN and AlInGaN layers, because only the final product is relevant, and not the process of making such as forming at a temperature greater than 750°C.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1).

10. In reference to claims 2 and 3, Chang does not disclose the exact compositional ratio of indium in the InGaN well layer. However Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1, hereinafter referred to as the "Makimoto" reference) discloses that adjusting the content of indium in an InGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 111-112). Thus Makimoto makes it clear that the content of indium in an InGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of indium in an InGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claims 2 and 3 are not patentably distinguishable over the Chang and Makimoto references.

11. Claims 4 and 5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Nettelblatt et al. (USPN 5,543,638).

12. In reference to claim 4, Chang does not disclose that the thickness of the InGaN well layer is 1 nm or greater and 2 nm or smaller. However Nettelblatt et al. (USPN 5,543,638, hereinafter referred to as the "Nettelblatt" reference) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claims 4 and 5 are not patentably distinguishable over the Chang and Nettelblatt references.

13. With regard to claim 5, Chang does not disclose that the thickness of the well layer is between 1.3 nm and 1.8 nm. However Nettelblatt (USPN 5,543,638) discloses that adjusting the thickness of a quantum well layer in order to attain a desired emission wavelength is known in the art (column 4, lines 8-10). Thus Nettelblatt makes it clear that the thickness of the well layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the thickness of the well layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 5 is not patentably distinguishable over the Chang and Nettelblatt references.

14. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1).

15. In reference to claim 6, Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 6 is not patentably distinguishable over the Chang and Makimoto references.

16. In reference to claim 7, Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to

one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 7 is not patentably distinguishable over the Chang and Makimoto references.

17. Claims 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al. (USPN 6,441,403 B1) in view of Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1).

18. In reference to claim 9, Chang et al. (USPN 6,441,403 B1) discloses a similar structure which meets the claim. Chang discloses (claims 1, 7, 13, and 19: columns 6-8) a gallium nitride (GaN)-based compound semiconductor device having a GaN-based light emitting member with a buffer layer adjacent to a light emitting layer member which comprises a multilayer quantum well layer structure including an InGaN well layer and an AlInGaN barrier layer. Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto et al. (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that

discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 6 is not patentably distinguishable over the Chang and Makimoto references.

19. With regard to claim 10, Chang does not disclose the exact compositional ratio of aluminum in the AlInGaN barrier layer or the exact compositional ratio of indium in the AlInGaN barrier layer. However Makimoto (United States Patent Application Publication No. US 2002/0195619 A1) discloses that adjusting the content of aluminum and indium in an AlInGaN layer in order to attain a desired bandgap is known in the art (p. 7, paragraph 112). Thus Makimoto makes it clear that the content of aluminum and indium in an AlInGaN layer is a result effective variable. It would have been obvious to one having ordinary skill in the art at the time of the invention was made to adjust the content of aluminum and indium in an AlInGaN layer, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Therefore claim 7 is not patentably distinguishable over the Chang and Makimoto references.

Allowable Subject Matter

20. Claims 12-15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter: the examiner is unaware of any prior art which suggests or renders obvious a

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gallium nitride based compound semiconductor device with a buffer layer adjacent to a gallium nitride based light emitting member which is comprised of a multilayer quantum well structure with an indium gallium nitride well layer and aluminum indium gallium nitride barrier layer that is used in combination with a superlattice cladding layer as suggested in claims 12-15.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Quinto whose telephone number is (571)272-1920. The examiner can normally be reached on M-F 8AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Sue Purvis can be reached on (571) 272-1236. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KVQ

/A. Sefer/
Primary Examiner
Art Unit 2826